position of every point might be determined with sufficient exactness for every practical purpose.

The time required for such an examination is estimated to be about ninety-eight hours, and the labour, no doubt, is very considerable; but when the errors thus ascertained have been duly noted in a table, Mr. Lax considers the utmost pains that can be bestowed upon any instrument to be amply compensated by the confidence given to every subsequent observation by means of it.

It is also proposed occasionally to obviate the effects of unequal expansion in any particular observation, by comparing the arc by which any angle has been measured with several succeeding equal arcs, until the multiple exceeds the whole circumference, and thereby includes the opposite errors, which arise from this cause in different parts of a circle, and correct each other.

On the Identity of Columbium and Tantalum. By William Hyde Wollaston, *M.D. Sec. R.S.* Read June 8, 1809. [*Phil. Trans.* 1809, *p.* 246.]

The author having received specimens of the Swedish mineral tantalite, containing the metal called Tantalium, by Mr. Ekeberg, was desirous of ascertaining whether that metal might not be the same as columbium, which had been discovered a short time before by Mr. Hatchett; and for that purpose he procured some oxide of columbium from Mr. Hatchett, and also a fragment of the mineral in the British Museum, originally analysed by Mr. Hatchett.

He describes the external resemblance to be such, that one might be taken for the other; but observes, that the columbite is rather more brittle than tantalite.

By analysis, also, he finds them to consist of the same three ingredients; namely, a white oxide, iron, and manganese.

To separate these substances, the mineral is powdered and fused with carbonate of potash and a small proportion of borax. The iron and manganese may then be dissolved, along with the salts employed, by muriatic acid, and the oxide of columbium or tantalium remains as a white powder for further trial of its properties.

Five grains of columbite being thus treated, left four grains of white oxide; and the solution yielded three fourths of a grain of iron, and one fourth of a grain of manganese.

Five grains of tantalite, by the same treatment, left four grains and a quarter of oxide, half a grain of iron, and two tenths of a grain of manganese.

The white oxides obtained from each of these minerals appear to the author to have precisely the same properties.

They are each soluble by means of about eight parts of potash.

They are both very imperfectly soluble by means of soda.

They are both insoluble in nitric, muriatic, succinic, and acetic acids.

They are both very sparingly soluble in strong sulphuric acid

while boiling; but they are nevertheless both perfectly soluble in oxalic acid, in tartaric acid, or in citric acid.

They are both precipitated of an orange colour by infusion of galls, but are not precipitated by that re-agent if a considerable excess either of alkali or acid prevail in the solution.

As a further agreement in their properties, it is added, that neither of them is precipitated by prussiate of potash or by hydrosulphuret of potash.

From these experiments, although a great difference which subsists between the specific gravities of the two minerals cannot be very satisfactorily explained, the author is satisfied that the American and Swedish minerals, in fact, contain the same metal.

Description of a reflective Goniometer. *By* William Hyde Wollaston, *M.D. Sec. R.S.* Read June 8, 1809. [*Phil. Trans.* 1809, *p.* 253.]

The instrument here described by the author is designed to obviate the inconvenience which has been found in attempting to measure any small crystals by the instruments hitherto used for that purpose.

When a surface is so small as one fiftieth of an inch in breadth, it becomes extremely difficult to apply the short radius of a goniometer to it with correctness. But since a surface of that magnitude may reflect a very brilliant light, the reflected ray may be employed as radius, and may at pleasure be taken of such a length that the angles of small crystals can be known with as much precision as those of the largest surfaces.

The crystal being attached to a horizontal axis, with its edge in the line of the axis, one of the surfaces is made to reflect some bright light to the eye; and, while the eye is retained steadily in the same place, the axis is turned till the second surface reflects the same light, and is consequently in the same position. The number of degrees through which the axis has turned being the supplement to the required angle, the angle itself is indicated by the graduations of a circle which moves with the axis; but the complete construction of the instrument cannot be distinctly understood without reference to a figure that accompanies the paper.

Since any inaccuracy in placing the crystal would occasion some error by parallax in this method of using the instrument, the author describes a second method, by which all error may be entirely obviated.

By placing the crystal so that the image of some distant object is brought to correspond with some other object by one of its surfaces, the position of that surface is determined with precision, and the second surface may be brought round to the same position with the utmost accuracy.

With this instrument the author has remarked an error in the supposed angle of the primitive crystal of carbonate of lime, which, instead of being 104° 28′ 40″, as it is now considered by writers on crystallography, appears to the author to be correctly 105°, as it was formerly measured by Huygens and by Sir Isaac Newton.